ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

TSCA INCINERATOR
U.S. DEPARTMENT OF ENERGY OAK RIDGE RESERVATION
OAK RIDGE, ANDERSON COUNTY, TENNESSEE
EPA FACILITY ID: TN1890090003
DECEMBER 27, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared by:

Federal Facilities Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Foreword

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the Superfund law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and cleanup of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations — the structure may vary from site to site. Whatever the form of the public health assessment, the process is not considered complete until the public health issues at the site are addressed.

Exposure

As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects

If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances than adults. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high-risk groups within the community (such as the elderly, chronically ill, and people engaging in high-risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic, and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is

not available. When it touches on cases in which this is so, this report suggests what further public health actions are needed.

Conclusions

This report presents conclusions about the public health threat, if any, posed by a site. Any health threats that have been determined for high-risk groups (such as children, the elderly, chronically ill people, and people engaging in high-risk practices) are summarized in the Conclusions section of the report. Ways to stop or reduce exposure are recommended in the Public Health Action Plan section.

ATSDR is primarily an advisory agency, so its reports usually identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Community

ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments

If, after reading this report, you have questions or comments, we encourage you to send them to us. Letters should be addressed as follows:

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List of Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CNF	Central Neutralization Facility
CREG	Cancer Risk Evaluation Guide
DCG	Derived Concentration Guide
DOE	U.S. Department of Energy
DRE	destruction and removal efficiency
EMEG	Environmental Media Evaluation Guide
EPA	U.S. Environmental Protection Agency
ERAMS	Environmental Radiation Ambient Monitoring System
ETTP	East Tennessee Technology Park
ISCST	Industrial Source Complex, Short Term
LLNL	Lawrence Livermore National Laboratory
MACT	maximum achievable control technology
mixed LLW	mixed low-level radioactive and hazardous waste
MRL	Minimal Risk Level
NAAQS	National Ambient Air Quality Standard
NEI	National Emissions Inventory
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NPL	National Priorities List
NTP	National Toxicology Program
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
ORRHES	Oak Ridge Reservation Health Effects Subcommittee
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PHA	public health assessment
PHAWG	Public Health Assessment Work Group
PM	particulate matter
PM10	particulate matter with aerodynamic diameters less than 10 microns
PM2.5	particulate matter with aerodynamic diameters less than 2.5 microns
POHC	principal organic hazardous constituent
ppm	parts per million
RBC-N	risk-based concentration for non-cancer effects
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
TDEC	Tennessee Department of Environment and Conservation
TDOH	Tennessee Department of Health
TEQ	toxic equivalent
TLD	thermoluminescent dosimeter
TRI	Toxics Release Inventory
TRV	thermal relief vent

TSCA	Toxic Substances Control Act
TSP	total suspended particulates
TVA	Tennessee Valley Authority
UCLA	University of California at Los Angeles
VOC	volatile organic compound

I. Summary

This public health assessment (PHA) evaluates environmental exposures to contaminants released from the "TSCA Incinerator" at the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR) in Roane County, Tennessee. The incinerator's name comes from the Toxic Substances Control Act, or TSCA, one of the environmental regulations governing the incinerator's operations. DOE contractors operate the TSCA Incinerator at a facility currently known as East Tennessee Technology Park (ETTP), formerly known as the K-25 site and as the Oak Ridge Gaseous Diffusion Plant. The TSCA Incinerator destroys organic chemicals in waste material and reduces the volume of waste materials that contain low-level radioactive contamination. The TSCA Incinerator began routine operations in 1991, and continues to operate today.

The Agency for Toxic Substances and Disease Registry (ATSDR) prepared this PHA to evaluate environmental health issues related to the TSCA Incinerator. The scientific approaches used in this PHA are consistent with relevant policies and guidance documents that ATSDR and other agencies have developed specifically for assessing human health risks posed by incineration facilities. The PHA focuses almost entirely on direct inhalation exposures to airborne contaminants, which presents the most likely pathway by which residents might come into contact with site-related contaminants. A separate PHA will consider the possibility of the TSCA Incinerator's air emissions causing environmental contamination in other media, such as surface water, soils, and food items.

What are the objectives of this PHA? (1) To determine whether local residents, other than workers, have been harmed by contaminants released by the TSCA Incinerator; (2) to respond to specific community concerns about the TSCA Incinerator; and (3) to make recommendations to help ensure that residents will not be exposed to harmful levels of site-related contaminants in the future.

This PHA's conclusions are based largely on environmental sampling data, stack tests, and other records generated by multiple parties. Over the last 2 years, ATSDR obtained documents and insights from

- the U.S. Environmental Protection Agency,
- the Tennessee Department of Environment and Conservation,
- the Tennessee Valley Authority,
- the DOE and its contractors,
- a group of independent experts chartered by the Governor of Tennessee,
- members of the Public Health Assessment Working Group (now known as the Exposure Evaluation Work Group),
- the ORR Local Oversight Committee, and
- local community members.

ATSDR considered all information provided by these parties when preparing this PHA.

The TSCA Incinerator has been studied extensively and continuously since it began routine operations in 1991. Multiple parties have quantified what the TSCA Incinerator releases into the air, modeled how contaminants move through the air, and measured what levels of air contamination are found beyond the ETTP facility property line. To date, ATSDR has reviewed tens of thousands of environmental measurements taken over the entire time that the TSCA Incinerator has operated. This PHA's conclusions, therefore, are based on an extremely large volume of data, especially when compared with data available for other incineration facilities that ATSDR has evaluated over the years. The remainder of this section presents ATSDR's key findings on the TSCA Incinerator, starting with the main conclusion, followed by summary statements on other issues.

Main Conclusion

The TSCA Incinerator releases trace levels of contaminants into the environment, but in amounts far below levels associated with health effects. Continued operation of the TSCA Incinerator is not expected to cause harmful exposures because numerous safeguards, pollution controls, and strict permitting requirements are in place to prevent unsafe operating conditions from occurring.

The following paragraphs review ATSDR's key findings on several individual topics. As Figure 1 illustrates, these individual findings paint a consistent picture of the limited air quality impacts from the TSCA Incinerator, and they form the foundation for the main conclusion stated above.

- **Design and operation of the TSCA Incinerator.** The TSCA Incinerator is designed to meet the strict requirements of multiple environmental regulations intended to protect human health and the environment. The TSCA regulations, for instance, require the incinerator to destroy at least 99.9999% of polychlorinated biphenyls (PCBs) in wastes. To reduce environmental impacts, a series of air pollution control devices minimize releases from the incinerator into the atmosphere. Moreover, sophisticated controls automatically shut down the entire incineration process if operating conditions are not maintained within limits specified in health-protective environmental permits. Using these and other observations, ATSDR concludes that the TSCA Incinerator is designed and is operated in a manner consistent with current best practices for thermal treatment facilities.

- **Amounts and types of wastes treated by the TSCA Incinerator.** The TSCA Incinerator treats liquid and solid wastes that contain various hazardous chemicals, including radioactive contaminants. All wastes must be thoroughly characterized before they arrive at the TSCA Incinerator, and their contamination levels must meet strict criteria before they can be treated. Health-protective environmental permits dictate the maximum amount of waste that the incinerator can process each year. In recent years, the amount of waste treated at the TSCA Incinerator has been only 5% of the permitted limits. In short, systems are in place to help ensure that the TSCA Incinerator does not process wastes that cannot be treated safely.

- **Air emissions from the TSCA Incinerator.** Stack tests and trial burns have measured emission rates under various operating scenarios for the eight groups of contaminants considered in this PHA:
    - particulate matter,
    - volatile organic compounds,
    - PCBs,
    - metals,
    - acidic gases,
    - dioxins and furans,
    - polycyclic aromatic hydrocarbons, and
    - radionuclides.

  With few exceptions, measured emission rates have been below health-protective limits established in the incinerator's environmental permits. In the isolated instances where higher emission rates were observed, ambient air monitoring data collected at the time show that air contamination at off-site locations was not affected. For many pollutants, the TSCA Incinerator's emissions account for an extremely small fraction of the total airborne emissions estimated for all of Roane County.

- **Dispersion modeling studies of the TSCA Incinerator's air emissions.** Both the independent panel previously chartered by the Governor of Tennessee and DOE have conducted extensive air modeling studies to understand how emissions from the TSCA Incinerator move through the air to off-site locations. ATSDR has also conducted a modeling evaluation to account for limitations in the previous studies. While air quality models have inherent uncertainties and can only estimate a source's potential air quality impacts, all three studies strongly suggest that the TSCA Incinerator's air quality impacts at off-site locations are minimal — a finding that has been supported by trends in the extensive air quality measurements at this site.

- **Relevant air quality measurements.** Since the TSCA Incinerator began treating wastes in 1991, multiple parties have measured the site's potential air quality impacts. These studies have appropriately focused on contaminants that incinerators cannot destroy, such as metals, particulates, and radionuclides. Several thousand ambient air sampling results are available for numerous locations that surround the TSCA Incinerator, including locations where air models predict the greatest impacts. These measurements strongly suggest that air emissions from the incinerator do not cause exposure levels of public health concern at off-site locations. Section IX of this PHA presents ATSDR's recommendations for enhancing the ongoing ambient air monitoring activities.

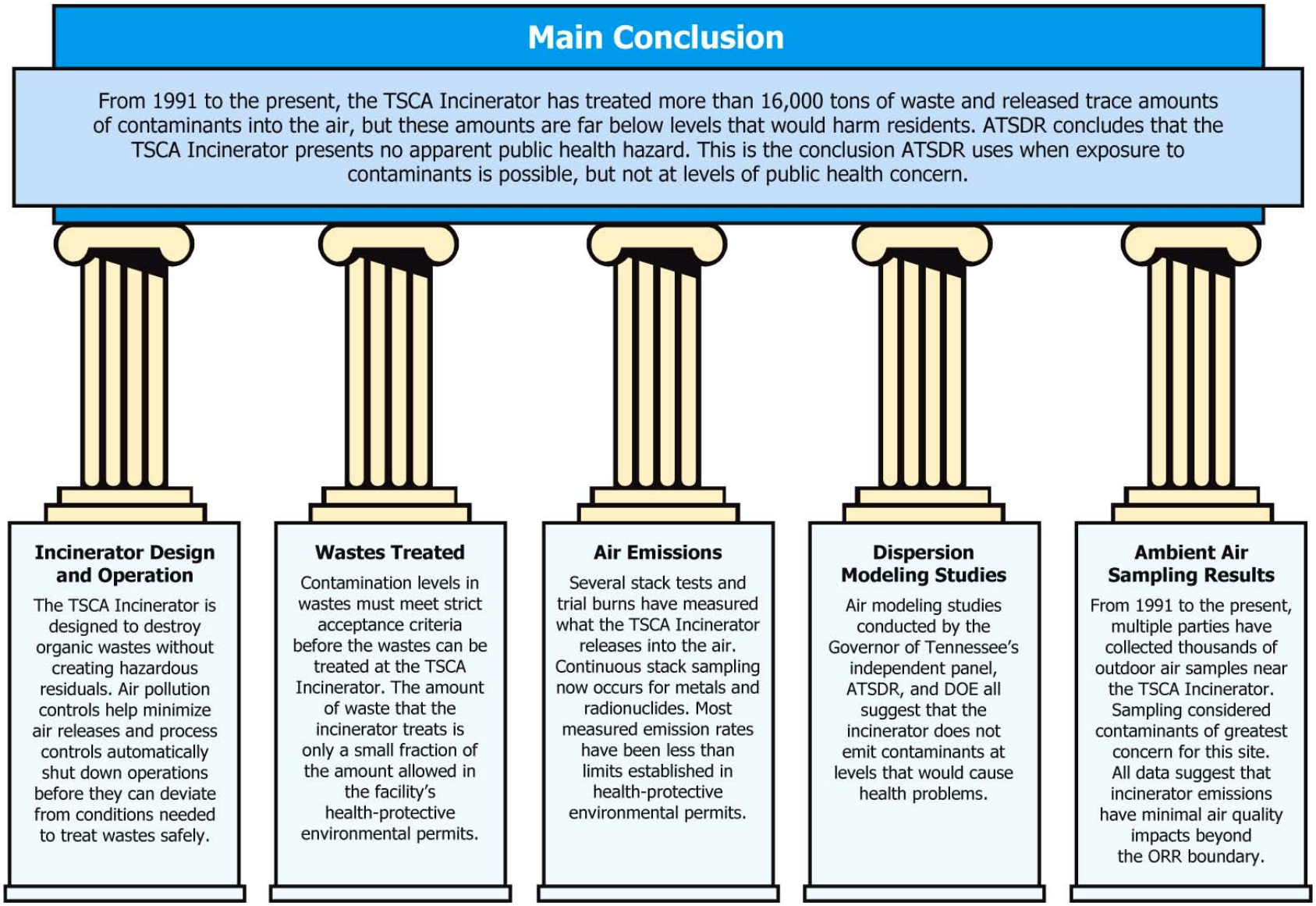

Figure 1. ATSDR's Main Conclusion and Supporting Lines of Evidence

Although the previous statements clearly support ATSDR's main conclusion for this site, it has become apparent to ATSDR that some community members have long-standing health concerns about the incinerator's ongoing operations, despite evidence suggesting that the site does not cause unhealthful exposures. To bridge this information gap, ATSDR recommends that TDEC annually issue fact sheets to brief residents on the incinerator's ongoing operations. These fact sheets should address inspection outcomes, regulatory compliance, agency oversight, and quantitative comparison of environmental sampling results collected by various parties.

When preparing this PHA, ATSDR identified regional air quality issues of potential health concern; namely, air quality across the Knoxville metropolitan area is occasionally poor when airborne levels of ozone and fine particles reach unhealthful levels. These air quality issues are regional in nature and result from industrial and motor vehicle emissions over a broad geographic area — emissions from the TSCA Incinerator appear to contribute little to these problems. When exposed to elevated levels of these pollutants, some people — particularly children, the elderly, and those with respiratory conditions — could experience lung irritation, difficulty breathing, and other health effects. On days with poor air quality, TDEC issues warnings that explain how people can reduce their exposure and how they can avoid adverse health effects. It is especially important for residents to heed these warnings and for adults to convey these warnings to their children, particularly asthmatic children.

The remainder of this PHA describes how ATSDR reached the conclusions and summary statements listed above. Those interested in only a brief summary of the main conclusions and recommendations should proceed to Sections VIII through X of this PHA. Those interested in a detailed account of ATSDR's scientific analyses are encouraged to read the entire report. Appendixes E and F of this PHA present a glossary and definitions of units of measurement used throughout this report.